SECTION 1: JTA OVERVIEW

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The Department of Defense (DoD) Warfighter battlespace is complex and dynamic, requiring timely and clear decisions by all levels of military command. There is an unprecedented increase in the amount of data and information necessary to conduct operational planning and combat decision making. Information concerning targets, movement of forces, condition of equipment, levels of supplies, and disposition of assets, both friendly and unfriendly, must be provided to joint commanders and their forces. Therefore, information must flow quickly and seamlessly among all tactical, strategic, and supporting elements.

As shown in Figure 1-1, Warfighters must be able to work together within and across Services in ways not totally defined in today's operational concepts and/or architectures. They must be able to obtain and use intelligence from national and theater assets that may be geographically dispersed among national and international locations. Today's split base/reach-back concept requires them to obtain their logistics and administrative support from both home bases and deployed locations. All of this requires that information flows quickly and seamlessly among DoD's sensors, processing and command centers, and shooters to achieve dominant battlefield awareness, and move inside the enemy's decision loop.

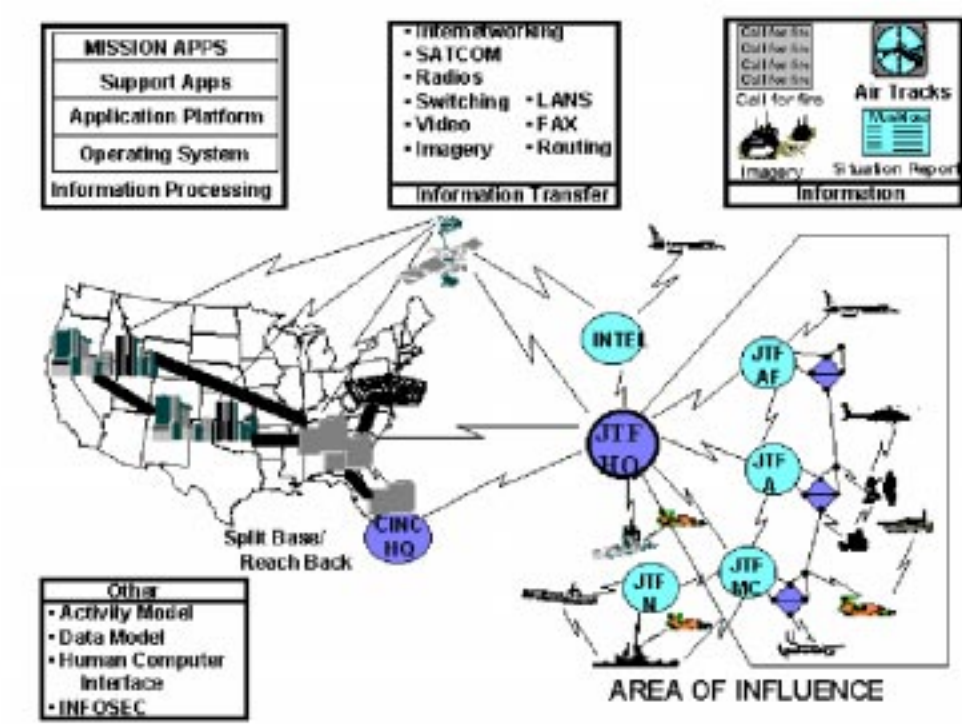

Figure 1-1 DoD Warfighter Information Technology Environment

The Joint Technical Architecture (JTA) provides the minimum set of standards that, when implemented, permits this flow of information in support of the Warfighter. As shown in Figure 1-1, there must be:

- A distributed information processing environment in which applications are integrated.
- Applications and data independent of hardware to achieve true integration.
- Information transfer assets to ensure seamless communications within and across diverse media.
- Information in a common format with a common meaning.
- Common human-computer interfaces for users, and effective means to protect the information.

The current JTA concept is focused on the interoperability and standardization of information technology (IT). However, the JTA concept lends itself to application in other technology areas, when required to support IT interoperability requirements.

1.1 INTRODUCTION TO THE JOINT TECHNICAL ARCHITECTURE

This section provides an overview of the JTA. It includes the JTA purpose, scope, background, and applicability; introduces basic architecture concepts; and discusses the selection criteria for standards incorporated in the document.

1.1.1 Purpose

A foremost objective of the JTA is to improve and facilitate the ability of our systems to support joint and combined operations in an overall investment strategy.

The DoD JTA:

- Provides the foundation for interoperability among all tactical, strategic, and combat support systems.

- Mandates interoperability standards and guidelines for system development and acquisition that will facilitate joint and coalition force operations. These standards are to be applied in concert with DoD Standards Reform.
- Communicates to industry the DoD's intent to consider open systems products and implementations.
- Acknowledges the direction of industry's standards-based development.

1.1.2 Scope

The JTA is considered a living document and will be updated periodically, as a collaborative effort among the DoD Components (Commands, Services, and Agencies) to leverage technology advancements, standards maturity, and commercial product availability. The scope of JTA Version 2.0 includes information technology and information technology-related standards in the DoD systems that may exchange information or services across a joint, functional, or organizational boundary. Information technology (IT) means any equipment or system that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. IT includes computers, communications systems, ancillary equipment, software, firmware, and their related procedures, services (including support services), and related resources.

The JTA is critical to achieving the envisioned objective of a cost-effective, seamless integration environment; achieving and maintaining this vision requires interoperability:

- Within a Joint Task Force/Commander in Chief (CINC) Area of Responsibility (AOR).
- Across CINC AOR boundaries.
- Between strategic and tactical systems.
- Within and across Services and Agencies.
- From the battlefield to the sustaining base.
- Between US, Allied, and Coalition forces.
- Across current and future systems.

1.1.3 Applicability

This version of the DoD JTA mandates the minimum set of standards and guidelines for the acquisition of all DoD systems that produce, use, or exchange information. The JTA shall be used by anyone involved in the management, development, or acquisition of new or improved systems within DoD. Specific guidance for implementing this JTA is provided in the separate DoD Component JTA implementation plans. Operational requirements developers shall be cognizant of the JTA in developing requirements and functional descriptions. System developers shall use the JTA to facilitate the achievement of interoperability for new and upgraded systems (and the interfaces to such systems). System integrators shall use it to foster the integration of existing and new systems.

The JTA will be updated periodically with continued DoD Component participation. Future versions of the JTA will extend the Version 2.0 scope in two dimensions: into other functional domains and into other technology areas. Version 2.0 begins the functional expansion by moving beyond the C4I domain to include other DoD domains.

1.1.4 Background

The evolution of national military strategy in the post-Cold War era, and the lessons learned from the recent conflicts of Desert Shield/Desert Storm have resulted in a new vision for the DoD. Joint Vision 2010 is the conceptual template for how America's Armed Forces will channel the vitality and innovation of our people and leverage technological opportunities to achieve new levels of effectiveness in joint warfighting. This template provides a common direction to our Services in developing their unique capabilities within a joint framework of doctrine and programs as they prepare to meet an uncertain and challenging future. The Chairman of the Joint Chiefs of Staff said in Joint Vision 2010, "The nature of modern warfare demands

that we fight as a joint team. This was important yesterday, it is essential today, and it will be even more imperative tomorrow."

Joint Vision 2010 (JV 2010) creates a broad framework for understanding joint warfare in the future, and for shaping Service programs and capabilities to fill our role within that framework. JV 2010 defines four operational concepts - Precision Engagement, Dominant Maneuver, Focused Logistics, and Full Dimensional Protection. These concepts combine to ensure American forces can secure Full Spectrum Dominance - the capability to dominate an opponent across the range of military operations and domains. Furthermore, Full Spectrum Dominance requires Information Superiority, the capability to collect, process, analyze, and disseminate information while denying an adversary the ability to do the same. Interoperability is crucial to Information Superiority.

Recognizing the need for joint operations in combat and the reality of a shrinking budget, the Assistant Secretary of Defense (ASD) Command, Control, Communications, and Intelligence (C3I) issued a memorandum on 14 November 1995 to Command, Service, and Agency principals involved in the development of Command, Control, Communications, Computers, and Intelligence (C4I) systems. This directive tasked them to "reach a consensus of a working set of standards" and "establish a single, unifying DoD technical architecture that will become binding on all future DoD C4I acquisitions" so that "new systems can be born joint and interoperable, and existing systems will have a baseline to move towards interoperability."

A Joint Technical Architecture Working Group (JTAWG), chaired by ASD (C3I), C4I Integration Support Activity (CISA), was formed and its members agreed to use the Army Technical Architecture (ATA) as the starting point for the JTA. Version 1.0 of the JTA was released on 22 August 1996 and was immediately mandated by Under Secretary of Defense, Acquisition Technology (USD A&T) and ASD (C3I) for all new and upgraded C4I systems in DoD.

JTA Version 2.0 development began in March 1997 under the direction of a Technical Architecture Steering Group (TASG), co-chaired by ASD (C3I)/CISA and USD (A&T) Open Systems Joint Task Force (OS-JTF). The applicability of Version 2.0 of the JTA is expanded to include the information technology in all DoD systems.

1.1.5 Architectures Defined

DoD has many efforts underway in support of the Warfighters' environment, one of which is the development and maintenance of the Joint Technical Architecture. In addition, other efforts are defining and consolidating DoD Architecture guidance through work in the Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) Architecture Framework and the evolution of the Technical Architecture Framework for Information Management (TAFIM). Work is currently being done at the DoD level to consolidate the guidance currently contained in the C4ISR Architecture Framework, the TAFIM, and other pertinent documents.

The C4ISR Architecture Framework provides information addressing the development and presentation of architectures. The framework provides the rules, guidance, and product descriptions for developing and presenting architectures to ensure a common denominator for understanding, comparing, and integrating architectures across and within DoD. As such, the development of the JTA aligns with the intended products and presentation schemes depicted in the C4ISR Architecture Framework. The C4ISR Architecture Framework document defines the process of developing systems within the construct of the three architectures defined. The content and structure of the JTA takes its definition from the C4ISR Framework.

An architecture is defined by the Institute for Electrical and Electronics Engineers (IEEE) in IEEE 610.12A-1990 as the structures or components, their relationships, and the principles and guidelines governing their design and evolution over time. DoD has implemented this by defining an interrelated set of architectures: Operational, Systems, and Technical. Figure 1-2 shows the relationship among the three

architectures. The definitions are provided here to ensure a common understanding of the three architectures[1].

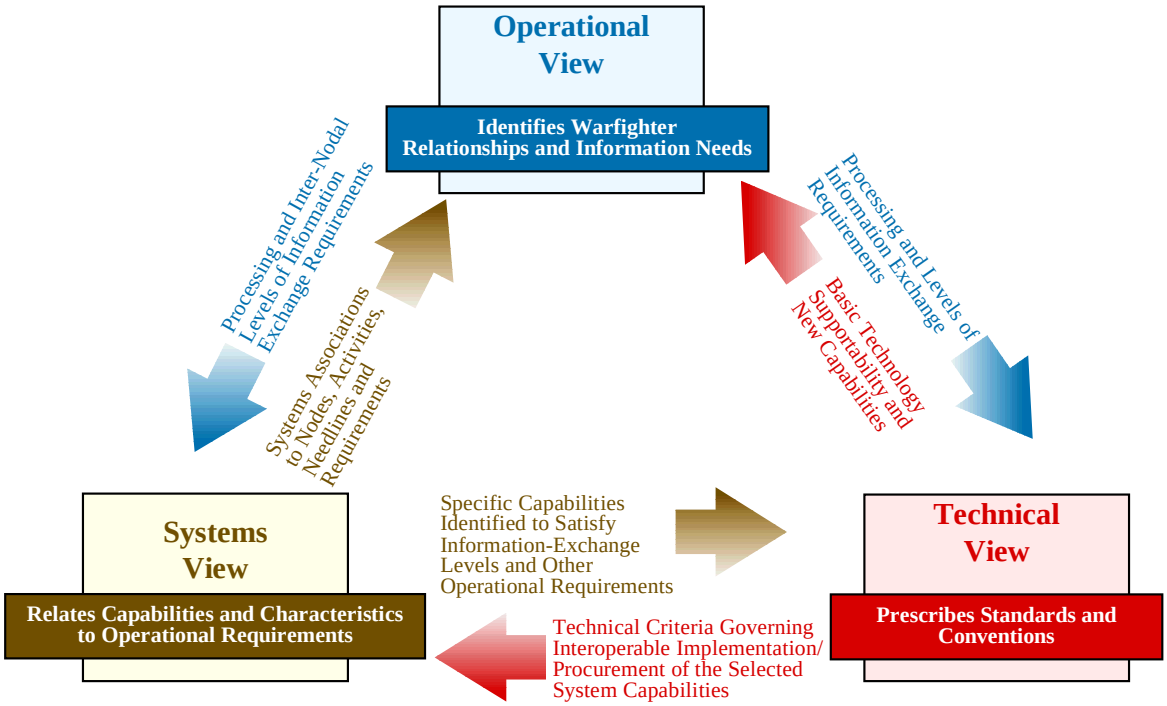

Figure 1-2 Architecture Relationships

1.1.5.1 Operational Architecture (OA) View

The operational architecture view is a description of the tasks and activities, operational elements, and information flows required to accomplish or support a military operation.

It contains descriptions (often graphical) of the operational elements, assigned tasks and activities, and information flows required to support the warfighter. It defines the types of information exchanged, the frequency of exchange, which tasks and activities are supported by the information exchanges, and the nature of information exchanges in detail sufficient to ascertain specific interoperability requirements.

1.1.5.2 Technical Architecture (TA) View

The technical architecture view is the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or elements, whose purpose is to ensure that a conformant system satisfies a specified set of requirements.

The technical architecture view provides the technical systems-implementation guidelines upon which engineering specifications are based, common building blocks are established, and product lines are developed. The technical architecture view includes a collection of the technical standards, conventions, rules and criteria organized into profile(s) that govern system services, interfaces, and relationships for particular systems architecture views and that relate to particular operational views.

[1] These definitions are extracted from the C4ISR Architecture Framework 2.0. The definitions and the products required by the framework focus on information technology. However, the concepts described can be applied to a wide range of technologies.

1.1.5.3 Systems Architecture (SA) View

The systems architecture view is a description, including graphics, of systems[2] and interconnections[3] providing for, or supporting, warfighting functions.

For a domain, the systems architecture view shows how multiple systems link and interoperate, and may describe the internal construction and operations of particular systems within the architecture. For the individual system, the systems architecture view includes the physical connection, location, and identification of key nodes (including materiel item nodes), circuits, networks, warfighting platforms, etc., and specifies system and component performance parameters (e.g., mean time between failure, maintainability, availability). The systems architecture view associates physical resources and their performance attributes to the operational view and its requirements following standards defined in the technical architecture.

1.2 DOCUMENT ORGANIZATION

The JTA is organized into a main body, followed by domain annexes, subdomain annexes, and a set of appendices. This section describes the structure of the document.

1.2.1 General Organization

The main body identifies the “core” set of JTA elements consisting of service areas, interfaces, and standards. Each section of the main body, except for the overview, is divided into three subsections as follows:

- Introduction - This subsection is for information purposes only. It defines the purpose and scope of the subsection and provides background descriptions and definitions that are unique to the section.
- Mandates - This subsection identifies mandatory standards or practices. Each mandated standard or practice is clearly identified on a separate bulletized line and includes a formal reference citation that is suitable for inclusion within Requests for Proposals (RFP), Statements of Work (SOW) or Statements of Objectives (SOO).
- Emerging Standards - This subsection provides an information-only description of standards which are candidates for possible addition to the JTA mandate. The purpose of listing these candidates is to help the program manager determine those areas that are likely to change in the near term (within three years) and suggest those areas in which "upgradability" should be a concern. The expectation is that emerging standards will be elevated to mandatory status when implementations of the standards mature. Emerging standards may be implemented, but shall not be used in lieu of a mandated standard.

1.2.2 Information Technology Standards

Section 2, also called the JTA core or main body, addresses commercial and Government standards common to most DoD information technology, grouped into categories; Information Processing Standards; Information Transfer Standards; Information Modeling, Metadata, and Information Exchange Standards; Human-Computer Interface Standards; and Information Systems Security Standards. Each category addresses a set of functions common to most DoD IT systems.

1.2.3 Domain and Subdomain Annexes

The JTA core contains the common service areas, interfaces and standards (JTA elements) applicable to all DoD systems to support interoperability. Recognizing that there are additional JTA elements common

[2] Systems: People, machines, and facilities organized to accomplish a set of specific functions, which cannot be further subdivided while still performing required functions. Includes the radios, terminals, command, control, and support facilities, sensors and sensor platforms, automated information systems, etc., necessary for effective operations.

[3] Interconnections: The manual, electrical, electronic, or optical communications paths/linkages between the systems. Includes the circuits, networks, relay platforms, switches, etc., necessary for effective communications.

within families of related systems (i.e., domains), the JTA adopted the Domain and Subdomain annex notion. A domain represents a grouping of systems sharing common functional, behavioral and operational requirements. JTA Domain and Subdomain annexes are intended to exploit the common service areas, interfaces and standards supporting interoperability across systems within the domain/subdomain.

The JTA Domain Annexes contain domain-specific JTA elements applicable within the specified family of systems, to further support interoperability within the systems represented in the domain - in addition to those included in the JTA core. Domains may be composed of multiple subdomains. Subdomains represent the decomposition of a domain (referred to as the subdomain's parent domain) into a subset of related systems, exploiting additional commonalities and addressing variances within the domain. Subdomain Annexes contain domain-specific JTA elements applicable within the specified family of systems, to further support interoperability within the systems represented in the subdomain - in addition to those included in the JTA core and in the parent Domain Annex. The relationships between the JTA core, Domain Annexes, and Subdomain Annexes currently included in the JTA are illustrated in Figure 1-3.

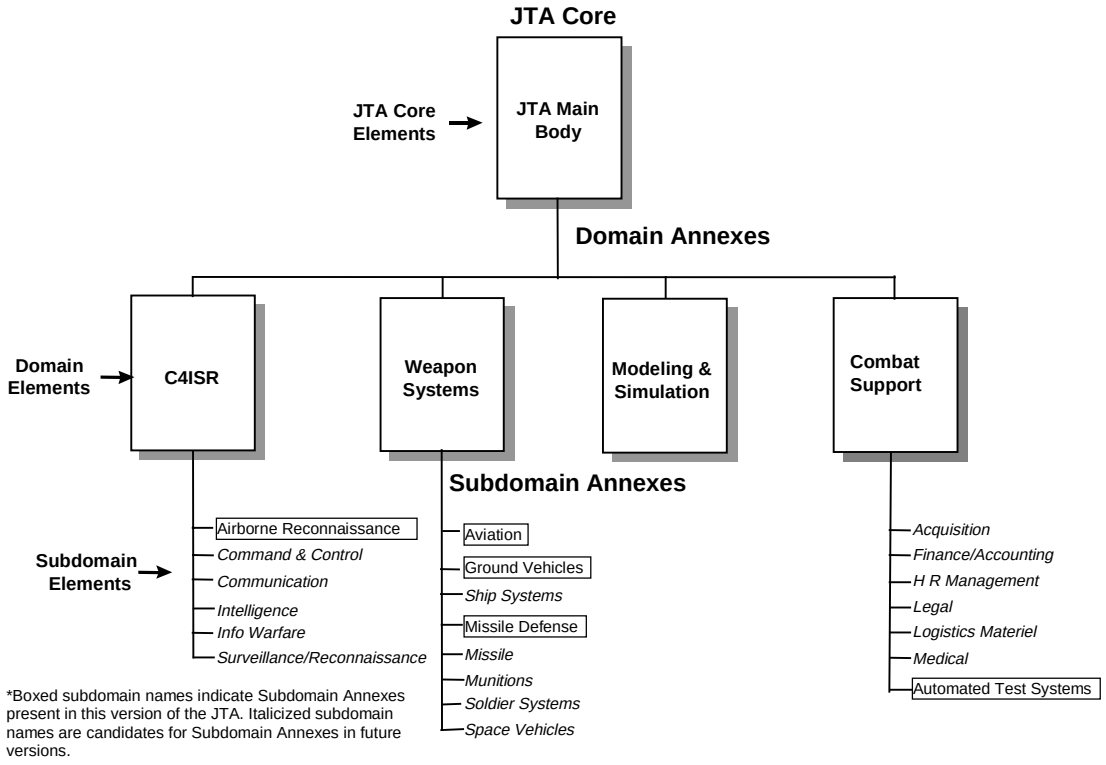

Figure 1-3 JTA Hierarchy Model

A program manager or engineer specifying or applying JTA standards for a specific system will first select all appropriate JTA core elements, and then those included in the relevant Domain and Subdomain annex.

As shown in Figure 1-3, the following Domain and Subdomain annexes are currently populated:

Domain Annexes:

- Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR).
- Combat Support (CS).
- Weapon Systems (WS).
- Modeling and Simulation (M&S).

Subdomain Annexes:

- Airborne Reconnaissance (AR).
- Automated Test Systems (ATS).
- Missile Defense (MD).
- Ground Vehicles (GV).
- Aviation (AV).

The goal is to build on these annexes by incorporating the requirements of additional domains and subdomains. Each Annex includes an introduction clearly specifying the purpose, scope, description of the domain, and background of the annex. As necessary, each annex provides a list of domain specific standards and guidance in a format consistent with the JTA core. Annexes generally use the TAFIM DoD Technical Reference Model (TRM) defined in Section 2.1.3.1, but may include a different or expanded model. Annex developers should define which standards apply to which system interfaces in their domain. They may address emerging standards that are of interest to the domain.

1.2.4 Appendices (Appendix A, B, C)

The appendices provide supporting information (e.g., how to get a copy of mandated standards) and available links to standards organization's home pages, which facilitate the use of the document, but are not mainline to its purpose.

Appendix A, "Acronyms and Glossary", includes an acronym list and glossary of terms referenced in the JTA.

Appendix B, "List of Mandated Standards and Sources", includes "retired," "mandated," and "emerging" standards for each JTA service area; and a list of organizations from whom documents cited in the JTA may be obtained.

Appendix C, "JTA Relationship to DoD Standards Reform", describes the relationship of the JTA to the DoD Standards Reform begun in June 1994 and addresses the relevance of the reform waiver policy to the JTA.

1.3 KEY CONSIDERATIONS IN USING THE JTA

In general, the JTA shall be used to determine the specific service areas and standards for implementation within new or upgraded systems. However, there are several key considerations in using the JTA.

The JTA service areas are based on the DoD TRM. For a more complete description of the DoD TRM and service areas refer to Section 2.1.3.1.

The mandatory standards in the JTA must be implemented or used by systems that have a need for the corresponding service areas. A standard is mandatory in the sense that if a service/interface is going to be implemented, it shall be implemented in accordance with the associated standard. If a required service can be obtained by implementing more than one standard (e.g., operating system standards), the appropriate standard should be selected based on system requirements.

The JTA is a "forward-looking" document. It guides the acquisition and development of new and emerging functionality and provides a baseline towards which existing systems will move. It is a compendium of standards (for interfaces/services) that should be used now and in the future. It is NOT a catalog of all information technology standards used within today's DoD systems. If legacy standards are needed to interface with existing systems, they can be implemented on a case-by-case basis in addition to the mandated standard.

If cited, requirements documents not identified in the JTA should complement and not conflict with the JTA core, and applicable Domain and Subdomain Annexes.

1.4 ELEMENT NORMALIZATION RULES

As the JTA evolves, the JTA elements contained in the JTA core, Domain Annexes and Subdomain Annexes will need to be periodically revisited and updated to ensure correctness. The JTA normalization rules in this section address the movement of elements across the core or annexes following the definitions and scope.

All standards are placed in the core unless they are justified as unacceptable to meet domain-specific requirements. When core standards cannot meet the requirements of a specific domain, JTA elements are removed from the JTA core and placed in the appropriate Domain Annex(es). Likewise, when domain standards cannot meet subdomain-specific requirements, those will be removed from the Domain Annex and placed in the appropriate Subdomain Annex(es).

The intent of the above normalization rules is as follows. (1) The core applies to all DoD systems. (2) The JTA core contains selected standards for as many JTA services as possible. (3) A service area provides the minimum number of alternative standards applicable to DoD.

Figure 1-3 also illustrates a notional hierarchy of JTA core, domains and subdomains – as defined by the Committee on Open Electronic Standards (COES) [Committee on Open Electronic Standards (COES) Report, DoD Open Systems-Joint Task Force (OS-JTF), July 1996], and tailored by the Joint Technical Architecture Development Group.

1.5 JTA RELATIONSHIP TO DOD STANDARDS REFORM

The DoD Standards Reform was begun in June 1994 when the Secretary of Defense issued a memorandum entitled "Specifications and Standards - A New Way of Doing Business." This memorandum directs that performance-based specifications and standards or nationally-recognized private sector standards be used in future acquisitions. The intent of this initiative is to eliminate non-value added requirements, and thus to reduce the cost of weapon systems and materiel, remove impediments to getting commercial state-of-the-art technology into weapon systems, and integrate the commercial and military-industrial bases to the greatest extent possible.

The JTA implements standards reform by selecting the minimum standards necessary to achieve joint interoperability. The JTA mandates commercial standards and practices to the maximum extent possible. Use of JTA mandated standards or specifications in acquisition solicitations will not require a waiver from standards reform policies. All mandatory standards in the JTA are of the types that have been identified by the DoD Standards Reform as waiver-free or for which an exemption has already been obtained. Additional information on this topic can be found in Appendix C.

1.6 STANDARDS SELECTION CRITERIA

The standards selection criteria used throughout the JTA focus on mandating only those items critical to interoperability that are based primarily on commercial open system technology, are implementable, and have strong support in the commercial marketplace. Standards will only be mandated if they meet all of the following criteria:

- **INTEROPERABILITY:** They enhance joint and potentially combined Service/Agency information exchange and support joint activities.
- **MATURITY:** They are technically mature (strong support in the commercial marketplace) and stable.
- **IMPLEMENTABILITY:** They are technically implementable.
- **PUBLIC:** They are publicly available.
- **CONSISTENT WITH AUTHORITATIVE SOURCES:** They are consistent with law, regulation, policy, and guidance documents.

The following preferences were used to select standards:

- Standards that are commercially supported in the marketplace with validated implementations available in multiple vendors' mainstream commercial products took precedence.
- Publicly held standards were generally preferred.
- International or national industry standards were preferred over military or other government standards.

Many standards have optional parts or parameters that can affect interoperability. In some cases, an individual standard may be further defined by a separate, authoritative document called a 'profile' or a 'profile of a standard' which further refines the implementation of the original standard to ensure proper operation and assist interoperability.

The word 'standards' as referred to in the JTA is a generic term for the collection of documents cited herein. An individual 'standard' is a document that establishes uniform engineering and technical requirements for processes, procedures, practices, and methods. A standard may also establish requirements for selection, application, and design criteria of material. The standards cited in the JTA may include commercial, federal and military standards and specifications, and various other kinds of authoritative documents and publications.

1.7 CONFIGURATION MANAGEMENT

The JTA is configuration managed by the Joint Technical Architecture Development Group (JTADG), under the direction of the DoD Technical Architecture Steering Group (TASG), and approved by the Architecture Coordination Council (ACC). These groups consist of members representing DoD and components of the Intelligence Community. The following organizations have voting memberships in both groups:

JTA VOTING MEMBERSHIP LIST
Assistant Secretary of Defense Command, Control, Communications and Intelligence/C4I Integration Support Activity (ASD (C3I)/CISA)
Ballistic Missile Defense Organization (BMDO)
Defense Airborne Reconnaissance Office (DARO)
Defense Information Systems Agency (DISA)
Defense Intelligence Agency/DoD Intelligence Information Systems (DIA/DoDIIS)
Defense Logistics Agency (DLA)
Defense Modeling and Simulation Office (DMSO)
Joint Staff/J6
National Imagery and Mapping Agency (NIMA)
National Reconnaissance Office (NRO)
National Security Agency (NSA)
US. Air Force (USAF)
US. Army (USA)
US. Marine Corps (USMC)
US. Navy (USN)
Under Secretary of Defense for Acquisition and Technology Open Joint Systems Task Force (USD (A&T) OS-JTF)

The JTA Management Plan describes the process by which the JTA will be configuration managed. This document, as well as the charter for the JTADG, may be found on the Defense Information Systems Agency (DISA) Center for Standards (CFS) JTA World Wide Web home page:

http://www-jta.itsi.disa.mil

Suggested changes to and comments on the JTA originating from DoD Components (Office of the Secretary of Defense (OSD), the Military Departments, the Organization of the Joint Chiefs of Staff (OJCS), the Unified and Specified Commands, and the Defense Agencies) should be submitted via the appropriate official JTA Component representative listed on the JTA web home page. These representatives will integrate and coordinate received comments for submission as official DoD Component-sponsored comments.

Industry and other non-DoD comments and suggested changes should be submitted through DISA CFS via electronic mail to **jta-comment@www.disa.mil**. All comments and suggested changes must be in the standard comment format described on the JTA World Wide Web home page.

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